

decreased. Such tendency is more clear in the comparative example 10 corresponding with Figs. 12 and 16. The intergranular phase is composed of white and isolated phase ( $\text{SmAlO}_3$ ) without any network microstructure ( $\text{SmAl}_{11}\text{O}_{18}$ ).

It is speculated that the characteristic properties of the sintered body according to the invention are provided through the following mechanism.

(Fine adjustment of volume resistivity)

The reason of the increase of volume resistivity by the addition of a second rare earth element is not clearly understood. A part of the added rare earth element might replace a part of Sm atoms of  $\text{SmAl}_{11}\text{O}_{18}$  phase and be dissolved into the phase to slightly change the properties. That is, the dissolved rare earth element might trap electrons working as carriers. Alternatively, the rare earth element might reduce non-stoichiometric property in Sm site or oxygen site so as to reduce defects and thus carriers.

(Improvement of strength)

The fracture of the aluminum nitride sintered body with the second rare earth oxide added mainly takes place along the intergranular phase. It is considered that the second rare earth element is dissolved into the Sm-Al-O intergranular phase to improve the strength of the intergranular phase, so that the overall strength of the body is improved.

(Densification of the sintered body is possible at a lower sintering temperature)

In some compositions, it is possible to realize sufficient densification at a lower sintering temperature by adding a second rare earth element. It is considered that  $\text{SmAl}_{11}\text{O}_{18}$  may be converted to liquid phase at a lower temperature, thus contributing to the reduction of sintering temperature, by simultaneously adding the second rare earth element.

As described above, it is possible to provide a material with a low volume resistivity at room temperature composed of an aluminum nitride sintered body.